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MONTANA BIOECONOMICS STUDY

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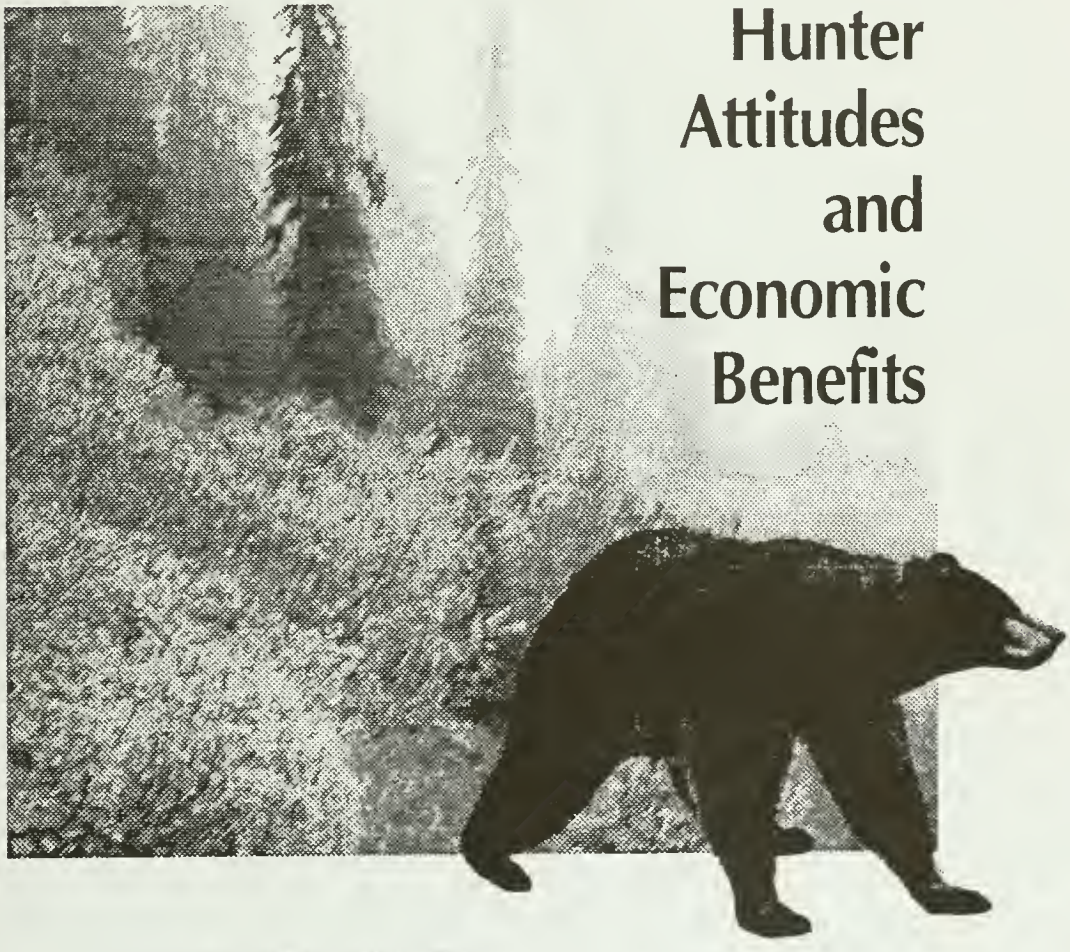

Hunter Attitudes and Economic Benefits

Montana Department of Fish, Wildlife & Parks

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MONTANA BIOECONOMICS STUDY

A CONTINGENT VALUATION ASSESSMENT OF BLACK BEAR HUNTING:

HUNTER ATTITUDES AND ECONOMIC BENEFITS

Prepared by:

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Montana Department of Fish, Wildlife and Parks

February 1993

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EXECUTIVE SUMMARY

Study Purpose

The objective of this study was to estimate the net economic value of black bear hunting in Montana. A survey of resident and nonresident bear hunters provided the data for the economic valuation as well as information on the hunters' attitudes and preferences and their opinions about specific black bear management issues.

Data Sources

The black bear survey was sent to 3000 hunters who hunted bears during either the 1991 spring or fall seasons. The sample was evenly divided between the spring and fall season and distributed to residents and nonresidents in the proportion by which they were represented in the database.

The Dillman Total Design Method was used to administer the survey. The response rate was 70%, similar to other mail surveys conducted by the Montana Department of Fish, Wildlife and Parks. Table 1 presents this information.

Descriptive Statistics

Resident and nonresident hunters differed in such areas as membership in sportsmen groups, income, and years hunting black bear. They were quite similar in the number of years and days per year that they hunt black bear. This information is presented in Chapter III.

Nonresidents traveled considerably further than resident hunters, as is expected and they were more likely to hire a guide. Successful hunters were asked what they did with the meat: 74% of resident hunters took all or some of the meat home, while only 57% of nonresidents did.

The reasons most often checked for hunting black bears was to be outdoors and for the solitude. Hunters generally chose a hunting area due to high bear numbers and ability to hunt with family/friends.

Asked their opinion about how to handle hunting if the black bear harvest needed to be reduced in a particular area, 48% of the hunters responding chose the option to allow unlimited hunting until a specific quota was reached.

Trip Valuation

Hunters responding to the economic valuation question were asked to value their most recent trip. A dichotomous choice contingent valuation format was used. The responses to this

question provided the data to estimate the economic value of a hunter's most recent black bear hunting trip. The state average net economic value was $52.00 per day. This value represents the amount an average black bear hunter would be willing to spend over and above what they actually spent.

The net economic values associated with resident and nonresident hunters were quite different, $39.00 vs. $84.00 respectively. There was not a significant difference between spring ($49.00) and fall ($55.00) hunters and the values they placed on their hunting experience. Economic values were also estimated by region. These estimates ranged from $61.00 per day for hunters in Region 3 to $42.00 for hunters in Region 2.

MONTANA BIOECONOMICS STUDY

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CHAPTER I

INTRODUCTION

Scope and Objectives

The objective of this study was to statistically estimate the net economic value of black bear hunting in the state of Montana. To accomplish this, a survey of black bear hunting practices and hunter attitudes and views was administered to a random sample of 1991 bear hunters. The survey asked hunters a variety of questions regarding their hunting, their attitudes about black bear management, their actual expenditures for their most recent hunting trip, and the value they placed on this hunting experience as well as some socio-demographic questions. Descriptive statistics were used to analyze hunter and trip characteristics. The economic valuation questions were analyzed using logistic regression techniques.

As stated above, the intent of this study is to estimate the economic value of black bear hunting. Other values associated with this resource such as viewing values and existence values have not been examined in this report. While these values may make up a large part of the total value associated with black bears, the estimation of these values is beyond the scope of this study. While the nonuse values are important when discussing the loss of or large scale impact to a resource, current use values (net economic value of hunting) are an adequate measure when showing the economic effects of marginal changes in black bear management.

Definition of Economic Benefits

Economics is the study of the efficient allocation of scarce resources for the benefit of society. Generally, the goods and services being used have readily observable prices and markets. Most wildlife resources, though, are not bought and sold in normal market settings, hence most benefits associated with uses of these resources are non-monetary. A resource does not need a day-to-day dollar value or market though, for one to use economic theory and principles in efficiently allocating the uses of these non-market resources.

To compare the allocation and uses of these market and non-market resources, they need a common basis for comparison. Economics attempts to provide a monetary point of reference for all resources.

The estimates of economic value of wildlife provide answers to the question, "What is the net social benefit from the use of wildlife?" (Fay and Thomas 1986a). This valuation can be used to derive demand curves or price-quantity relationships that are used to show the value of wildlife-related activities. The area under the demand curve and above actual expenditures is called consumer surplus, net economic value or net willingness to pay.

The concept of net economic value is often hard to grasp. One way to view this value is to consider it a personal income equivalent in that it is equal to real income but not actually cash in hand. It can be considered the "added" benefit a person gains from the use of the good or service.

U.S. Water Resources Council Principles and Guidelines (1983) requires that many federal agencies employ net willingness to pay in measuring the value of resources. The U.S. Department of the Interior also requires that net willingness to pay be used in measuring society's gains and losses when assessing natural resource damage (U.S. Department of the Interior 1986). The Bureau of Land Management also uses this concept when estimating the value of wildlife in their cost benefit analyses.

CHAPTER II

METHODS

Survey Design

The Montana Black Bear Hunting Survey was used to collect a wide range of information from spring and fall black bear hunters. The survey was divided into four sections (See Appendix A for a copy of the survey).

Section I covered the respondent's black bear hunting history as well as how this activity compares to other outdoor recreation activities.

Section II dealt with the hunter's most recent black bear hunting trip. Included in this section are questions concerning trip characteristics, reasons for black bear hunting and why they chose an area, and a number of management-related questions regarding this activity.

Section III provided information on the hunter's trip expenditures, travel time and distance traveled, as well as contingent valuation questions.

Section IV furnished information on socio-demographic characteristics including age, income, sex, employment, etc.

The data collected from Sections I, II, and IV are presented in Chapter III. The information from the contingent valuation question in Section III is detailed in Chapter IV.

Sample and Survey Administration

The sample for this study were those resident and nonresident hunters who purchased a black bear license during 1991. Resident sportsman license holders as well as nonresident big game combination license holders were not part of the sample population. The Dillman Total Design Method (1978) was used to conduct the mail survey. Black bear hunters first received a cover letter and survey along with a postage paid return envelope. One week later everyone was sent a reminder postcard. Those hunters who had not returned their surveys after the third week were mailed a second survey, cover letter, and return envelope.

Survey Response Rates

Three thousand questionnaires were mailed to spring and fall black bear hunters. The sample was divided evenly between the two seasons and also split between resident and nonresident hunters in the ratio they were represented in the license database. This resulted in 1275 resident and 225 nonresident hunters being sampled during both the spring and fall seasons.

The response rate was similar to other mail surveys conducted by the Department of Fish, Wildlife and Parks (Duffield and Neher 1991, Brooks 1988). From the initial sample of 3,000, 94 surveys were undeliverable, and 2,030 were returned. There were 1,988 surveys included in the analysis, the remaining 42 surveys were either returned too late to be included in the analysis or the respondent had not hunted black bear in 1991. The overall response rate for this study was 70%.

The Contingent Valuation Method

The Contingent Valuation Method (CVM) is one of two accepted methodologies for estimating net willingness to pay (net economic value), the other is the Travel Cost Method (TCM). Both are recommended by the U.S. Water Resource Council (1983) for valuing nonmarket resources. The U.S. Forest Service also recognizes these methods and incorporates net willingness to pay values into their RPA analyses.

The contingent valuation method differs from the travel cost method in that TCM relies upon observed behavior (i.e. how trips taken to a recreation site decrease as travel costs increase) to estimate a demand curve. CVM on the other hand takes a more direct approach by simply asking people what they are willing to pay for something, in this case a black bear hunting trip.

A number of question formats have been developed for CVM use. They are:

1. the open-ended question where respondents are asked the maximum amount they would pay for the recreational activity,

2. iterative bidding game format where the person is asked to respond yes or no to a specific bid. If they respond yes, then the bid amount is raised until they respond no. In this manner their maximum willingness to pay is revealed.

3. the dichotomous choice format where the respondent is asked to respond yes or no to a specific dollar bid. The bid levels are systematically varied across the sample.

While each of these question formats have their strengths and weaknesses, the dichotomous choice format has shown it can provide fair approximations to actual market transactions (Welsh 1986, Bishop and Heberlein 1980).

Contingent valuation has been used to value a wide variety of resources (water and air quality, hunting and fishing, and scenic beauty) and is limited only by the ability of the person developing the survey to draft understandable questions and the person answering them to be willing to provide accurate estimates of value. To this end, researchers have identified six areas that are critical in developing sound CVM questions:

1. target population
2. product definition
3. payment vehicle
4. question format
5. method of analysis
6. supplemental data.

The target population in this study was licensed black bear hunters, the product was a black bear hunting trip and the payment vehicle chosen was an increase in the trip costs for the hunting trip. This payment vehicle was realistic and emotionally neutral as opposed to a license fee increase. The question format and analysis have been discussed earlier.

Estimation of Net Economic Value Using Dichotomous Choice CVM

The Montana Black Bear Survey utilized a dichotomous choice format to value black bear hunting. Although the analysis of the data is more complex than the other question formats discussed, the advancement of discrete choice models make this complexity acceptable and manageable.

The estimation of a demand curve using dichotomous choice requires discovering the relationship between the bid amount asked and probability of a respondent saying "yes" to that bid amount. This relationship can be shown graphically as a two dimensional curve. The area under the curve represents the maximum willingness to pay for a black bear hunting trip. Generally, the integration occurs between zero and some maximum value, usually the highest bid amount in the sample.

CHAPTER III

DESCRIPTIVE STATISTICS

The Montana Black Bear Hunter Survey asked black bear hunters about their bear hunting behavior, their attitudes and preferences regarding bear management, social values concerning hunting, as well as information regarding their most recent trip and socio- demographic data. The information presented in this chapter has been broken into resident and nonresident categories where appropriate. Past surveys have shown that there is a marked difference between resident and nonresident hunters (Duffield and Neher 1990, Brooks 1988).

The 1,988 people who sent back a completed questionnaire were divided into resident/ nonresident subgroups or by fall vs. spring hunting for the descriptive analysis. Of the respondents, 73% were residents. The number of hunters in these groups is shown in Table 1.

Table 1. Black bear hunter sample and subsample sizes.

Hunter Group	Sample Size	Percentage
Complete Hunter Sample:		
Resident	1,443	72.6%
Nonresident	545	27.4%
Total	1,988	100.0%
Spring Hunter Sample:		
Resident	722	70.7%
Nonresident	299	29.3%
Total	1,021	100.0%
Fall Hunter Sample:		
Resident	719	74.5%
Nonresident	246	25.5%
Total	965	100.0%

Hunter Characteristics

As mentioned above, respondents were separated by residency to observe possible differences in hunter characteristics. As Table 2 points out, there are some marked differences, but not as obvious as other hunter types surveyed in the past (Duffield and Neher 1991 and 1990). The number of years and days hunted black bear was very similar for residents and nonresidents as was their average age. The biggest differences between these two groups was the percentage belonging to a sportsman group (41% of residents vs. 55% of nonresidents) and their average income. Thirty percent of the respondents said black bear hunting was their favorite or one of their favorite outdoor activities.

Table 2. Black bear hunter characteristics by residency.

Characteristic	Residents	Nonresidents
Years hunted black bear	9.5	7
Days/year hunt black bear	10.5	9
Days hunted black bear in Montana	10.5	9
# of years hunted this area	8	5
% belonging to sports group	41	55
Average age	37	39
Average income	$28,700	$44,000

Trip Characteristics

Section II of the Black Bear Hunting Survey asked hunters questions about their most recent black bear hunting trip as well as a number of questions regarding their reasons for hunting and thoughts about various management issues. Table 3 provides details about the hunter's most recent trip. The major differences between resident and nonresident hunter's trips lies in the percentage who hired a guide, miles driven, years hunted the area, and the number of trips to the hunting area. While the average (mean) number of trips by residents and nonresidents to the hunting area is six and three trips, respectively, the median number of trips is only three and one.

Table 3. Black bear hunting trip characteristics by residency.

Characteristic	Resident	Nonresident
Percent who hired a guide	0.5%	22%
Days hunted this trip	5.0	6
Number of other hunters seen	4	6
Years hunted this area	8.3	5
Average miles driven	66	996
Average number of trips to hunting area*	6	3

*Median number of trips: resident = 3, nonresidents = 1

Hunters were asked what their primary method(s) of hunting black bear was from a list of six possibilities and to report what weapon they used. Walking closed roads (22%) and walking likely areas (24%) were the two most checked methods of hunting black bears. Roads, both open and closed, accounted for the most activity by hunters (51%). A survey of spring black bear hunters in northwest Montana by Thier (1990) showed about the same results with one notable difference. Only about 10% of the hunters sampled by Thier said they walked likely areas compared to 24% in this study. This difference may be explained by the fact that his sample was only hunters from HD 100 in northwest Montana compared to a statewide sample in this survey. The most commonly carried weapon was the modern rifle followed by bow and arrow and handguns. This information is shown in Tables 4 and 5.

Table 4. Methods of hunting black bear.

Hunting Method	Percent of Sample
Walked closed roads	22
Biked closed roads	3
Walked through likely places	24
Drove roads	12
Glass openings from roads	14
Glass opening while in back country	19
Other	6
Total	100

Table 5. Type of weapon used by black bear hunters.

Weapon Type	Percent of Sample
Rifle	81.6
Bow/arrow	11.6
Handgun	5.3
Shotgun	.6
Muzzleloader	.9
Total	100.0

Black Bear Hunter Motivation and Management Preferences

It is important to wildlife managers to understand the reasons a hunter chooses to black bear hunt and the reasons they chose the area they did to hunt. Understanding how hunters feel about black bear management is also of interest to managers. A number of questions were asked in the Montana Black Bear Hunter Survey to provide insight into these areas.

Table 6 presents the information on why respondents hunted black bear. The top three reasons were: to be outdoors, to be in a natural setting, and for the solitude. The least important reason for hunting black bear was for the meat.

Table 6. General reasons for black bear hunting.

	Very Important	Important	Not Very Important	Not at all Important
a. For the solitude	35%	48%	13%	3%
b. Test my hunting skills	21%	44%	27%	8%
c. To bag a trophy bear	17%	30%	39%	13%
d. To be outdoors	71%	28%	1%	--
e. For the meat	13%	31%	33%	23%
f. Be in a natural setting	45%	47%	6%	1%
g. Learn about black bears	25%	53%	17%	5%

Percentages are based on those respondents who answered the questions.

Some of the reasons hunters chose an area to hunt and their importance are given in Table 7. The most important reason given for choosing an area was high black bear numbers followed by being able to hunt with family/friends and the fact that an area was logged. While these reasons were picked by more respondents as being important or very important, over half of the hunters felt that good public access, closed roads, as well as being able to bag a trophy bear were important criteria when choosing where to hunt.

Table 7. Reasons for choosing a place to hunt black bear and their importance.

	Very Important	Important	Not Very Important	Not at all Important
a. Good public access	24%	32%	27%	16%
b. High bear numbers	43%	44%	10%	3%
d. Open roads	13%	37%	33%	18%
c. Close to home	16%	34%	34%	16%
e. Bag a trophy	22%	36%	31%	11%
h. Logged areas	30%	39%	20%	11%
f. Hunt with family/friends	34%	45%	17%	4%
g. Familiarity with area	11%	31%	41%	17%
i. Closed roads	24%	30%	32%	13%

Percentages are based on those respondents who answered the questions.

Successful hunters, 12.7% of respondents, were asked what they did with the meat. Seventy four percent of the successful resident hunters took home from 25-100% of the meat while 57% of the nonresidents did likewise. Respondents were also asked if they passed up any legal bears and why. Thirty four percent of the hunters reported passing up a legal black bear. The most common reason given was small size.

Hunters were asked if the number of open roads for hunting purposes was about right, too few, or too many, and if they felt they had increased, decreased, or stayed the same. Sixty six percent of respondents felt the number of roads was about right. Thirty-five percent felt the number of open roads had decreased in the last few years while 33% felt they had stayed the same. Asked whether hunters should be able to use roads for game retrieval 89% said hunters should be able to use open or closed roads for this purpose.

When asked which management option they would prefer if harvest needed to be reduced in a hunting district, 48% of black bear hunters chose the option to allow unlimited hunting until a specific quota is reached. Only 29% of the respondents preferred hunting by permit, and 22% wanted unlimited hunting but shorten the season length.

Black Bear Hunter Expenditures

Black bear hunters were asked to provide information about the costs of their most recent trip. The categories were transportation, food and lodging, equipment purchased just for this trip, access/guide fees, and any other incidental expenses associated with this trip. Resident hunters spent an average of $98.00 per trip or $19.60 per day. Nonresidents spent considerably more than resident hunters, $826.00 per trip or $137.50 per day, for their hunting trip. License fees are not included in these costs. This information is presented in Table 8.

Table 8. Black bear hunter expenditures by residency.

Statistic	Residents	Nonresidents
Transportation	$35.00	$254.00
Food and lodging	27.00	201.00
Equipment for trip, guide fees, and other expenses	36.00	370.00
Total	$98.00	$826.00
Average number of days per trip	5	6
Average expenditure/day	$19.60	$137.50

CHAPTER IV

CONTINGENT VALUATION ESTIMATES

Valuation Questions Asked

Black bear hunters were asked to answer questions regarding the cost of their most recent trip and a CVM question about the value they placed on this trip. This question asked:

> Suppose that everything about this last hunt was the same except your trip costs had been $xxxx more; would you still have made the trip?

This economic valuation question faced the respondent with a specific dollar amount which he/she could respond "yes or no" to. The dollar amounts ($xxx) were one of eight predetermined bid levels and were randomly selected ranging from $10 to $2,000.

Outlier and Protest Responses

The analysis of the responses to the CVM questions requires that responses to these questions be excluded if they are willing but unable to pay the stated bid amount or they are protesting in some way the hypothetical market.

In the first case, if a respondent answers yes to the bid amount but is obviously unable to pay this sum based on their income they are removed from the analysis. Economic theory requires both the willingness and ability to pay. Ability to pay was calculated by determining what percentage of their income hunters were willing to spent on black bear hunting. The following equation shows how this was calculated:

$$\text{Percent} = [(\text{Total} + \text{Bid}) * \text{Trips}] / \text{Income}$$

where:

Total	=	total amount spent on the trip
Bid	=	bid amount asked
Trips	=	number of trips taken to the area this season
Income	=	reported annual income

Initially, all respondents with a percentage equal to or greater than one were excluded since this group lacks the ability to pay. Next, a three standard deviation interval was placed around the calculated mean to determine the upper limit for outlier exclusion. This resulted in 37 observations being eliminated from the analysis.

The other group of respondents excluded from the analysis were those hunters who were protesting the simulated market. The U.S. Water Resource Council recommends that a followup question be asked to determine the reasons for a negative response. Black bear hunters who indicated they would not pay the bid amount but had a valid reason were left in the sample. Hunters were excluded from the sample as protest bids if they indicated they did not understand the question or were opposed to any increases in fees or taxes, etc. An additional 19 respondents were dropped from the analysis due to protest bids.

Model Specification

Black bear hunters' net willingness to pay (net economic value) was estimated by analyzing their responses to the CVM question using logistic regression. A comprehensive discussion of this theory and methods is provided in Duffield and Patterson (1991).

Economic theory suggests that particular variables will influence an individual's response to a CVM question. This study used a bivariate model that regressed "yes and no" responses upon the bid amounts asked. It is assumed that as the bid amount increases, the probability of a "yes" response will decrease.

The specification of the logit equation is shown in Equation 1.

$$\ln(P/1-P) = B0 + B1 \ln(Bid)$$

where: P = probability of a "yes" response
Bid = dollar amount of increased trip costs respondent was asked to pay

The estimated equations are shown in Appendix B. The coefficients for the independent variable ln(Bid) had the expected sign (negative) and were significant at the 95% level. Based on the results of the models, the responses are logical and consistent with economic theory.

Benefit Estimates

The measure of economic benefits (net economic value) used in this study is the truncated mean. The bivariate form of the model can be graphed with the probability of a "yes" response on the vertical axis and the bid amount on the horizontal axis. Graphing this relationship shows a high probability of acceptance at low bid amounts with the probability decreasing and approaching zero at high bid levels. Integrating the logit function from zero to an upper limit, generally the highest bid amount, provides an estimate of the mean or maximum willingness to pay. The upper level of integration for the black bear study was $2000.00, the highest bid level.

While there is no analytical method for deriving standard errors of the truncated means, a bootstrapping procedure by Duffield and Patterson (1991) provides reliable estimates.

Table 9 presents the estimates of net economic value for the black bear hunter's most recent trip as well as for resident/nonresident and fall/spring subgroups. Resident hunters valued their trip at $197.00 while the nonresidents' value was significantly higher at $503.00. The overall sample value was $272.00. The fall/spring subgroups showed an interesting difference. Fall hunters placed a higher value on their trip than the spring hunters, $312.00 vs. $232.00. One reason for this difference may be that fall hunters were not solely hunting black bears and the value they gave for the trip was based on the fact they could hunt multiple species.

Table 9. Montana black bear hunting net economic values: per trip and per day values.

Model	Sample Size	Net Economic Value (Truncated Mean*)	
		Per Trip	Per Day
Entire Sample (standard errors)	1,668	272.46 (12.40)	52.39
Resident	1,270	197.00 (10.62)	39.40
Nonresident	398	503.08 (42.09)	83.83
Fall Hunters	812	312.00 (16.34)	54.73
Spring Hunters	856	231.86 (14.40)	49.33
* The truncation point for the mean value estimate was $2,000, the maximum bid level.			

Net economic values were also estimated by Montana Department of Fish, Wildlife and Parks administrative regions. Only five of the seven regions have black bears. As Table 10 shows, hunters in regions 3 and 4 placed the highest value on their hunting trip. Standard errors were not estimated for the regional values, since it was not known how many hunters for each bid level by region there were. While the difference in value between regions 2 and 3 is large, it is not known if this difference is statistically significant.

Table 10. Montana black bear hunting net economic values: per trip and per day estimates by region.

Model	Sample Size	Net Economic Value	
		Per Trip	Per Day
Region 1	558	258.58	46.17
Region 2	339	245.80	42.38
Region 3	231	292.57	60.95
Region 4	136	281.41	58.62
Region 5	56	174.16	45.83

Black bear hunting is a major hunting activity in Montana, rivaling antelope hunting in total number of hunter days. In 1991, black bear hunters spent approximately 97,000 days afield pursuing their quarry (Black Bear and Archery Hunting and Harvest Report 1991). Figs. 1 and 2 provide a graphical view of the regional/statewide numbers of hunters and bears harvested during the spring and fall. Based on the number of hunter days, total net economic value associated with black bear hunting is approximately $5,000,000 annually.

Figure 1. Number of hunters and bears harvested, spring 1986-1991.

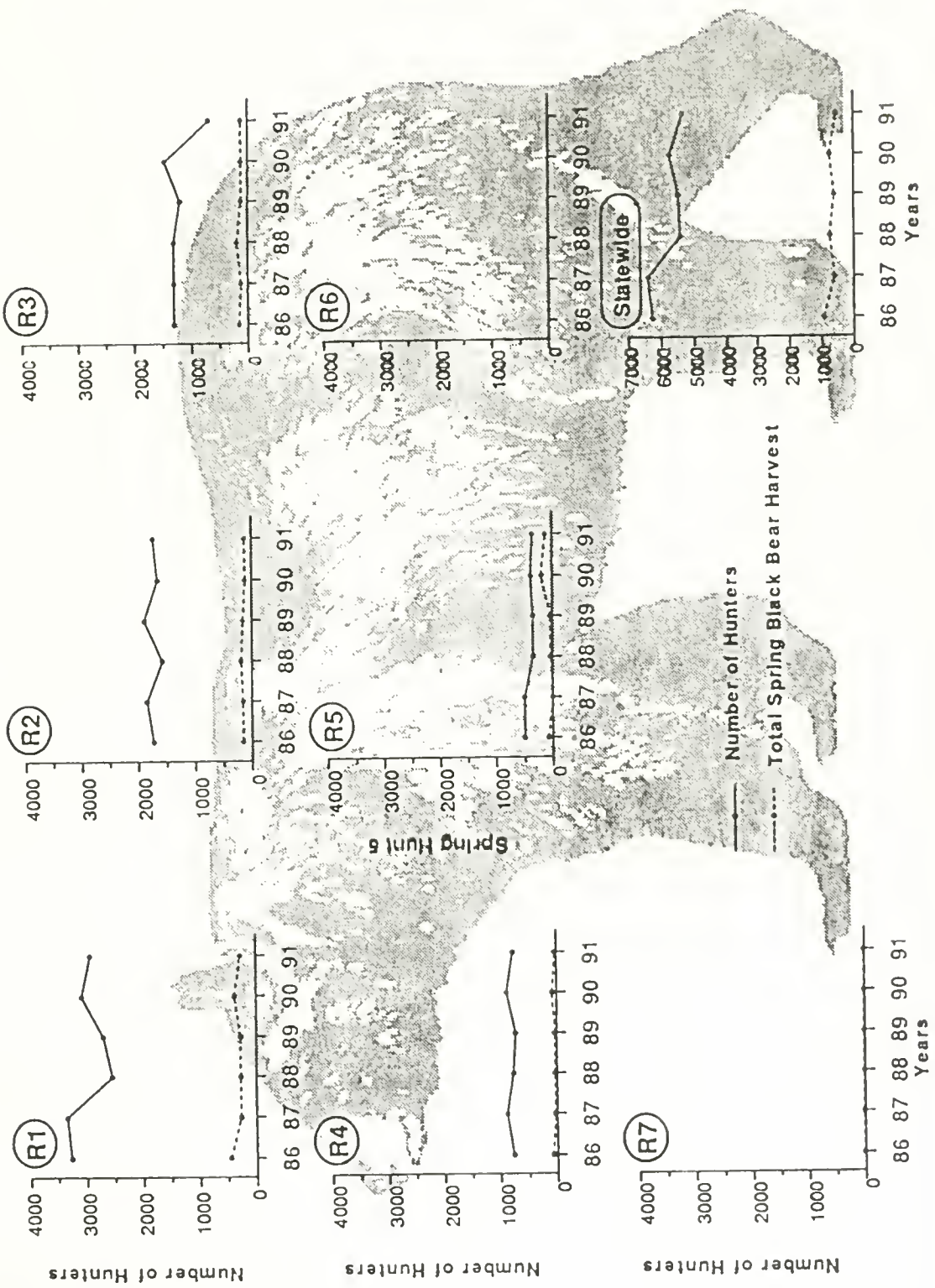

Figure 2. Number of hunters and bears harvested, fall 1986-1991.

Comparison of Results to Previous Studies

The results of this study can be compared to other big game studies conducted in Montana. While none of the other studies were done on the value of black bear hunting, the comparison will show how this activity compares to the other types of hunting activity. As mentioned earlier, this study may not have been entirely successful at isolating just hunters who were strictly hunting black bears during the fall season.

A study by Brooks (1988) estimated the value of deer hunting in Montana using the travel cost method. This study estimated the per day value of deer hunting to be about $55.00 in 1985 dollars. A dichotomous choice CVM study of California deer hunters found a statewide average net economic value of $68.73 per day (Loomis, Creel, and Cooper 1989).

Duffield (1988) estimated the value of elk hunting in Montana using the TCM. The results of this study showed elk hunters' net economic value to be $65.58 per day.

While these reports do not value black bear hunting they provide a basis for comparing the results of this study against other types of big game hunting. Comparing the results from these other studies provides support that the estimates of value for black bear hunting are reasonable.

While nonuse values associated with black bears have not been estimated in this study, it should be pointed out that wildlife viewing is an important outdoor activity. Studies done on the value of bear viewing at McNeil Sanctuary indicate the value associated with this opportunity is in the range of $174.00 - $300.00 per person for a four day permit (Clayton and Mendelsohn 1990, Hill 1988).

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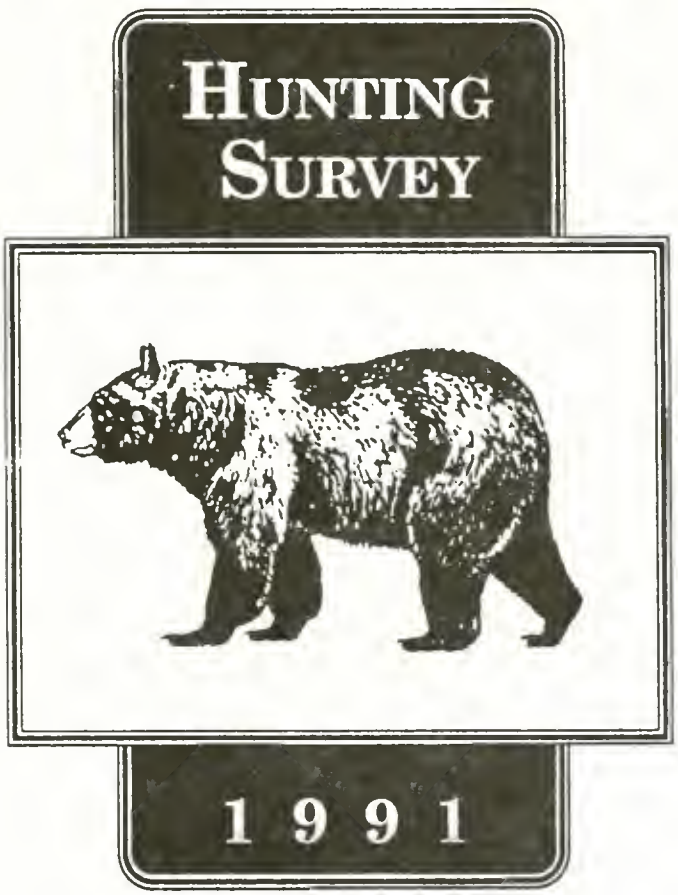
APPENDIX A

Montana Black Bear Hunting Survey

❖ Montana ❖

BLACK BEAR



I. FIRST, WE HAVE SOME GENERAL QUESTIONS ABOUT YOUR HUNTING

1. How many years have you been hunting black bears? _____Years

2. About how many days per year do you hunt black bears? _____Days

3. How many of these were spent black bear hunting in Montana? _____Days

4. How would you rate bear hunting compared to your other outdoor recreation activities? *(please check one)*

   _____ It's my favorite outdoor recreation activity

   _____ It's one of my favorite outdoor recreation activities

   _____ It's just one of several outdoor recreation activities that I do

   _____ I prefer other outdoor recreation activities

II. THE NEXT QUESTIONS ASK ABOUT YOUR MOST RECENT BLACK BEAR HUNTING TRIP IN MONTANA DURING THIS FALL (1991)

1. Approximate date(s) of this last trip:_____
   (A trip could be anything from an hour to several or more days)

2. Use the map provided to show what HUNTING DISTRICT you visited on this trip.
   (If you hunted in more than one district, write the number of the ONE district where you spent the most time)

   Hunting district number: _____
   (from map on back of the cover letter)

IN ALL OF THE FOLLOWING QUESTIONS, "THIS AREA" MEANS THE HUNTING DISTRICT NUMBER YOU JUST LISTED

3. On this trip, how many days did you hunt in this area? _____Days

4. About how many hours per day did you hunt? _____ Hours

5. About how many black bears did you see while hunting in this area?

   _____ Black bears seen in this area

6. Did you kill a black bear in this area? ___ Yes___ No

7. If yes, how much of the meat did you take home?

   ___25% ___50% ___100% ___None

8. Were any legal bears passed up because of small size, hide color, etc?

   _____Yes *(If yes, why:)* _____No

   ___Small size

   ___Hide color

   ___Hide quality

   ___Other *(Describe)* _____

9. How many black bears did you shoot at during this last trip?

   ___Black bears shot at.

   ___How many times did you shoot?

10. How many black bears did you hit?_____Number hit

11. What type of equipment did you use in this area? *(please check all that apply)*

    ___Muzzle loader ____Rifle ___Bow and arrow

    ___Handgun ____Shotgun

12. Did you hire a hunting guide or outfitter in this area?

    ___ Yes ___No

13. What was your primary method*(s)* of hunting black bears?

    ___Walk closed roads

    ___Bicycle closed roads

    ___Slowly walk through likely places

    ___Drive roads

    ___Glass openings from roads

    ___Glass openings while in backcountry

    ___Other *(describe)* _____

14. About how many other hunters (not in your party) did you see while you were hunting on this trip?

    ___Other hunters

15. Was this number of hunters : (please check one)

___More than I expected to see

___About as many as I expected to see

___ Fewer than I expected to see

___I didn't have any expectations

16. Did the other hunters present affect your enjoyment of the hunting in this area?

___Yes ___ No

17. If yes, please explain how :

_____

18. Was this the first time you hunted in this particular area?

____Yes ___ No, I've hunted here before

19. If no, how many years have you been hunting in this area?

____Years

20. How many separate trips did you make from your home to this hunting area this season?

____ Separate trips from home this year

21. For hunting purposes, do you feel the number of roads for vehicle use in this area is : *(please check one)*

____Too few

____About right

____Too many

22. In the last few years, has the number of open roads in this area increased, decreased, or stayed the same? *(check one)*

____Increased

____Decreased

____Stayed the same

____I'm not sure

23. For game retrieval purposes, how do you feel the existing roads in this area should be managed? *(please check one)*

____Hunters should be allowed to use only open roads to retrieve game with a vehicle

____Hunters should be allowed to use closed roads to retrieve game with a vehicle

____Hunters should be allowed to use vehicles off roads to retrieve game

24. What are the most important factors you consider when deciding where to go black bear hunting? *(please check the box that best reflects the importance of each item.)*

	Very Important	Important	Not Important	Not at all Important
a. Good public access	❑	❑	❑	❑
b. High bear numbers	❑	❑	❑	❑
c. Close to home	❑	❑	❑	❑
d. Open roads	❑	❑	❑	❑
e. Chances of bagging a trophy	❑	❑	❑	❑
f. To hunt with family or friends	❑	❑	❑	❑
g. Familiarity with the area	❑	❑	❑	❑
h. Logged areas	❑	❑	❑	❑
i. Closed roads	❑	❑	❑	❑

25. People hunt for many reasons. We'd like to know some of the reasons you hunted this area on this trip to help us understand different types of hunters and their preferences.

Following is a list of possible reasons for hunting. Please check the box that indicates why you hunted in this particular area on this trip

	Very Important	Important	Not Important	Not at all Important
a. For the solitude	❑	❑	❑	❑
b. To test my hunting skills	❑	❑	❑	❑
c. To bag a trophy bear	❑	❑	❑	❑
d. To be outdoors	❑	❑	❑	❑
e. For the meat	❑	❑	❑	❑
f. To be in a natural setting	❑	❑	❑	❑
g. To learn more about black bears	❑	❑	❑	❑

26. Could you please look over this list again and circle the letters of the <u>three</u> most important reasons you hunted in this area on this trip?

28. What is your general opinion of black bear management in Montana?

_____ 1. Very good
_____ 2. Fairly good
_____ 3. Not very good
_____ 4. Bad
_____ 5. Very bad
_____ 6. No opinion

29. If it is determined the black bear harvest must be reduced in a specific hunting district, which management option would you prefer? *(check only one)*

___ Allow unlimited hunting until a specific quota is reached, then close season.

___ Allow unlimited hunting, but reduce the season length.

___ Allow hunting by permit only.

III. THE NEXT FEW QUESTIONS WILL HELP US UNDERSTAND THE VALUE YOU PLACE ON BLACK BEAR HUNTING IN THIS AREA

WE REALIZE YOU AREN'T USED TO CONSIDERING HUNTING THIS WAY, BUT PLEASE THINK ABOUT IT AND GIVE US YOUR BEST ESTIMATE!

1. About how far is it from your home to where you hunted in this area on this trip?

___ Miles (one-way)

2. How long did it take to travel from your home to this area?

___ Hours (include any stops made en route)

3. If you drove, how many other hunters were in the vehicle?

___ Number of other hunters

4. About how much did you personally spend on this trip? If you can't recall the exact amount, please give your best estimate for each of the following three types of expenses.

$ _____ Amount I spent for transportation (gas, car rental, airfare and any other transportation costs)

$ _____ Amount I spent on food, beverages, and lodging

$ _____ Amount I spent on equipment purchased just for this trip, access or guide fees, and all other expenses

$ _____ TOTAL AMOUNT I SPENT ON THIS HUNTING TRIP

5. Suppose that everything about this last hunt was the same except your trip costs had been $_____ more; would you still have made the trip?

___ Yes, I would still have made the trip

___ No. If no, would you have made the trip if your share of the expenses had been only $1.00 more?

___ Yes ___ No. If no, could you briefly explain why not:

_____

IV. THESE LAST FEW QUESTIONS WILL HELP US UNDERSTAND YOUR RESPONSES BY KNOWING SOME BASIC INFORMATION ABOUT YOU

1. Where are you from? City: _____ State: _____

2. What is your age? _____ Years

3. Are you: _____ Male _____ Female

4. Are you a member of any hunting, conservation or sport organization?

_____ Yes _____ No

5. If so, which one(s): _____

6. What is the highest level of formal education you completed?

___ Some grade school
___ Finished grade school
___ Finished junior high school
___ Finished high school
___ Some college
___ Finished college
___ Some postgraduate work
___ Finished postgraduate

7. During the hunting season this year, were you ? (check one)

___ Employed full time
___ Employed part time
___ Unemployed
___ Retired
___ Homemaker
___ Other : _____

8. Please check your household's income before taxes last year :

___ Under 5,000
___ 5,000 - 9,999
___ 10,000 - 14,999
___ 15,000 - 19,999
___ 20,000 - 24,999
___ 25,000 - 29,999
___ 30,000 - 34,999
___ 35,000 - 39,999
___ 40,000 - 49,999
___ 50,000 - 74,999
___ 75,000 - 100,000
___ over 100,000

APPENDIX B

Estimated bivariate logistic contingent valuation equations.

Model	Statistics		Likelihood Ratio-Goodness of Fit Test		
	Intercept	Log (Bid)	Degrees of Freedom	Chi Square	P Value
Entire Sample	4.26	-.9718	6	2.01	.91
Fall Subsample	4.53	-.9832	6	5.22	.5159
Spring Subsample	4.08	-.9782	6	5.04	.5383
Resident	4.09	-1.0178	6	3.24	.7786
Nonresident	6.28	-1.1418	6	13.72	.0329
Regional Models					
R1	3.94	-.9296	6	7.93	.2436
R2	3.47	-.8632	6	4.23	.6453
R3	4.58	-1.0055	6	.94	.9879
R4	4.24	-.9595	6	7.56	.2723
R5	5.38	-1.1604	6	3.67	.7213

Median values - this measure of willingness to pay is defined as the point where 50% of the sample would say "yes" to the bid amount asked.

the median is defined as:

$$\text{median} = \exp\left\{-\frac{BO}{B1}\right\}$$

The estimates of net economic values based on the median:

Model	Net Economic Value (Median)	
	Per Trip	Per Day*
Entire Sample	80.13	20.03
Residents	55.62	18.54
Nonresidents	244.71	48.94
Fall Hunters	100.22	25.05
Spring Hunters	64.77	21.59
* Based on median number of days hunted on most recent trip.		